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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,119	03/31/2004	David L. O'Meara	250643US6 YA	3702

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EXAMINER	
DHINGRA, RAKESH KUMAR	

ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
11/20/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/813,119	O'MEARA ET AL.	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17-40 and 42-45 is/are pending in the application.
- 4a) Of the above claim(s) 10-15, 18-28, 32-38, 40 and 42-44 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-9, 17, 29-31, 39 and 45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 9/7/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/28/07 has been entered.

Response to Arguments

Applicant's arguments with respect to claims 1, 2-9, 16, 17, 29-31, 39, 41 and 45 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Applicant has amended claims 1 and 30 by adding new limitations (for example in claim 1 – “comprising quartz having raised portions thereon” and “a thermal barrier adjacent to said backside of the holding device, the thermal barrier comprising a thermally variable material and a reflecting surface facing the plurality of heating units; a cooling unit coupled to the back side of the holding device such that said thermal barrier is interposed between the cooling unit and the heating unit, said cooling unit configured to cool said wafer;” etc. Further applicant has also cancelled claim 16.

Accordingly claims 1-15, 25-40 and 42-45 are now pending, out of which claims 1-9, 16, 29-31 and 45 are active.

New references [Park (US PG PUB No. 2004/0211772), Kato et al (US Patent No. 5,609,689) and Kaneko et al (US Patent No. 5,223,113)] when combined with Ogura read on amended claim 1 limitations. Accordingly claims 1-9 and 39 have been rejected under 35 USC 103 (a) as explained below.

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Further, balance claims 17, 29-31 and 45 have also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-9, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PG PUB No. 2002/0125240) in view of Park (US PG PUB No. 2004/0211772), Kato et al (US Patent No. 5,609,689) and Kaneko et al (US Patent No. 5,223,113).

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Regarding Claim 1: Ogura et al teach a wafer heating apparatus 110 (Figures 6A, 6B) comprising a substrate holder having a holding device 111 that has a wafer support surface configured to support a wafer and a backside surface, and further has a recesses 111a with its middle portion extending along the wafer surface and end portions that extend to openings in the backside surface of support base 111. A heater 112 is disposed in the groove 111a. Ogura et al also teach the support base is mounted in the processing chamber with the help of a support tube (Figure 6A and paragraphs 0006-0009).

Ogura et al do not teach wafer support surface comprising quartz having raised portions, plurality of heater (heating units) having carbon wire heater formed of fibers and enclosed in tube, connecting terminals, a thermal barrier with a reflecting surface adjacent to holding device and disposed between the heating unit and a cooling unit, and a coupling unit coupled to the cooler unit and configured to mount the substrate holder to a processing chamber.

Park teaches a heating unit comprising a carbon fiber heater 20 having a middle section sealed within a quartz tube 10 and opposing ends that extend to an exterior of the tube and where connecting terminals 30 are formed. Park also teach that such heating unit is used in semiconductor manufacturing apparatus (for example, Figure 4 and paragraphs 0004, 0043-0053).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to replace the sheathed heater of Ogura with the a carbon heater sealed in a quartz tube as taught by Park to provide a heater suitable for operating at high temperature in plasma processing apparatus.

Ogura et al in view of Park do not teach wafer support surface comprising quartz having raised portions, a thermal barrier with a reflecting surface adjacent to holding device and disposed between the heating unit and a cooling unit, and a coupling unit coupled to the cooler unit and configured to mount the substrate holder to a processing chamber.

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Kato et al teach a wafer processing apparatus comprising a wafer support surface comprising quartz (support members 20) and raised portions 21 for supporting a wafer W. Kato et al further teach that the apparatus further comprises a heater unit 13 with a reflector 16, a cooling unit 17 and a coupling unit 18 (for example, Figure 1 and column 3, line 42 to column 4, line 35).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a wafer support surface having raised portions, and a cooling unit with a coupling unit as taught by Kato et al in the apparatus of Ogura et al in view of Park to avoid direct contact of wafer with the wafer support surface, and temperature control of wafer by the cooling unit enabling compactness of the processing chamber (used in conjunction with the heating unit of Ogura et al).

Ogura et al in view of Park and Kato et al do not teach a thermal barrier with a reflecting surface adjacent to backside of the holding device and disposed between the heating unit and the cooling unit.

Kaneko et al teach a wafer processing apparatus comprising a heating unit with a heater 53, a cooling unit 20 and a thermal barrier 56 made of a thermally variable material (quartz) and disposed between the heating and cooling units and having reflecting surface facing the heating unit 54 and having insulating coupling units 22 {having lower thermal conductivity than cooling unit 17 (aluminum – Kato et al) and heating unit (quartz - Kato et al) [for example, Figure 2 and column 4, lines 1-45].

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a thermal barrier having a reflecting surface and disposed between the heating unit and the cooling unit as taught by Kaneko et al in the apparatus of Ogura et al in view of Park and Kato et al to provide thermal isolation between the heating and the cooling units.

Regarding Claims 2-9: Ogura et al teach that recess 111a is shaped as per shape of the heating unit. Further, Ogura et al in view of Park, Kato et al and Kaneko et al teach the heating unit comprises a curved tube 20 (Figure 4 – Park) mounted in a curved recess 111b (Figure 6A – Ogura et al). It would be

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obvious to mount a circular, square, rectangular, elliptical or a U-shaped tube into a correspondingly shaped recess in the holding device (paragraph 0007 – Ogura et al).

Regarding Claim 39: Ogura et al in view of Park, Kato et al and Kaneko et al teach a single heating unit on a single holding device. It would be obvious to duplicate the wafer heating assembly (including holding device with corresponding heating units) to increase through-put during wafer processing.

In this connection it has been ruled by courts (Case law):

“Duplication of parts was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).”

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PGPub No. 2002/0125240) in view of Park (US PGPub No. 2004/0211772), Kato et al (US Patent No. 5,609,689) and Kaneko et al (US Patent No. 5,223,113) as applied to claims 1-9, 39 and further in view of Szekeresch et al (US Patent No. 6,919,538).

Regarding Claim 17: Ogura et al in view of Park, Kato et al and Kaneko et al teach all limitations of the claim except temperature sensor coupled to substrate holder.

Szekeresch et al teach an apparatus (Figure 1) that includes a base plate (substrate holder) 3 for holding substrate S and having grooves 7 that help divide the underside of plate 3 into plurality of square shaped heating elements 10 and where each heating element (that is substrate holder) is provided with temperature sensors (not shown in figure) (column 4, lines 10-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a temperature sensors with holding device as taught by Szekeresch et al in the apparatus of Ogura et al in view of Park, Kato et al and Kaneko et al to enable monitor the temperature of holding device.

Claims 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PG PUB No. 2002/0125240) in view of Park (US PG PUB No. 2004/0211772), Kato et al (US Patent No. 5,609,689) and Kaneko et al (US Patent No. 5,223,113) as applied to claims 1-9, 39 and further in view of Takahashi et al (US Patent No. 6106,628).

Regarding Claim 29: Ogura et al in view of Park, Kato et al and Kaneko et al teach all limitations of the claim except a cover coupled to holding device.

Takahashi teach an apparatus (Figure 1) that includes a wafer heating assembly comprising:

a base (holding device) B with susceptors 8, 9 and having a plurality of grooves (recesses) 14, the base (holding device) having turntables (wafer supports) 2, 3 configured to support a wafer 1;

a plurality of heating units 4, 5 disposed in respective grooves (recesses) 14 wherein at least one heating unit comprises heater 13;

rotary shafts 6, 7 to which turn-tables are attached on a common axis of rotation C.

Takahashi further teach that heaters 13 are resistive heaters and are enclosed by quartz cover plate 16. Takahashi also teach turn-tables 2, 3 (like cover) coupled to the base (holding device) B {Figure 1 and column 2, line 15 to column 3, line 5}.

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a cover for being coupled to heating device as taught by Takahashi in the apparatus of Ogura et al in view of Park, Kato et al and Kaneko et al to enable provide transmission of thermal energy from the heaters and also provide mechanical protection to the heaters.

Regarding Claim 30: Kato et al teach raised portions 21 to avoid direct contact between wafer and the substrate support. It would be obvious to provide such raised portions on the cover (as taught by Takahashi) to provide gap between the wafer and the cover surface in view of teaching of Kato et al.

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Regarding Claim 31: Ogura et al in view of Park, Kato et al, Kaneko et al and Takahashi et al teach raised portions on the wafer support surface (as already explained above under claim 1). Further it is known in art to use a temperature sensor as one of the substrate supporting pins (raised portion) on a substrate support surface.

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura et al (US PGPub No. 2002/0125240) in view of Park (US PGPub No. 2004/0211772), Kato et al (US Patent No. 5,609,689) and Kaneko et al (US Patent No. 5,223,113) as applied to claims 1-9, 39 and further in view of Schaper et al (US Patent No. 6,353,209).

Regarding Claim 45: Ogura et al in view of Park, Kato et al and Kaneko et al teach all limitations of the claim except alternate cooling mechanism corresponding to carbon wire heating elements to increase speed of thermal response and configured to flow gas or other coolant fluid.

Schaper et al teach an apparatus (Figure 4A, 7A-C) that includes a thermal processing module 50 for temperature control of substrate 10 and includes heating elements 56 whose temperature can be independently controlled and further includes a cooling plate (cooling mechanism) 62 that helps to cool or control the ramp rate of individual heating elements [column 3, line 20 to column 4, line 10 and column 5, line 5 to column 6, line 55).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide cooling mechanism as taught by Schaper et al in the apparatus of Ogura et al in view of Park, Kato et al and Kaneko et al to achieve desired temperature profiles during substrate processing.

Conclusion

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh K. Dhingra



Karla Moore
Primary Examiner
Art Unit 1792